Unit #1-3

① a) volunteers w/ high avg. blood pressure

b) 100mg med, 200mg med, placebo

c) explanatory = med / placebo

response = blood pressure

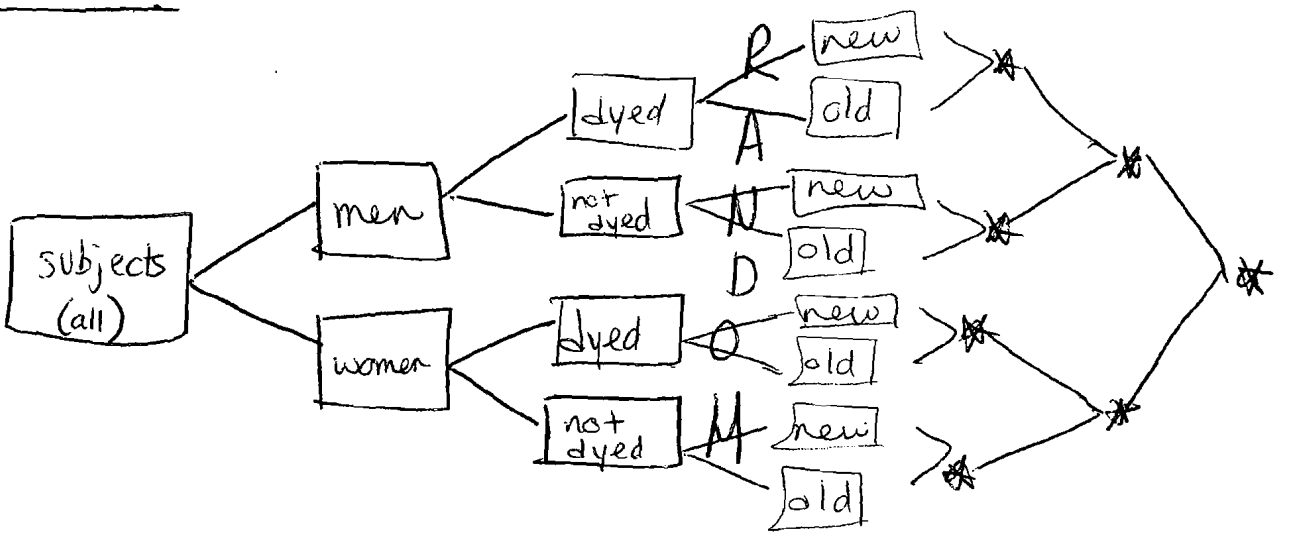
d) - No, not blind

- Can be double blind if both subjects + people handing out meds + recording results don't know who is getting which treatment

e) could block for gender, diet, exercise, weight, etc., before giving meds/placebo out.

Unit #1-3

(2)



* = compare effects of shampoo on hair

(3) a) undercoverage - those w/o phones
those w/ unlisted #'s
nonresponse - those who don't answer
those who hang up.

b) undercoverage - those w/o homes
those who aren't registered voters
nonresponse - those who don't send mailing back

c) <u>over</u> coverage - he might interview people who are <u>not</u> her constituents
undercoverage - not all constituents go by downtown office
nonresponse - those who don't stop
resp. bias - pollster might influence responses
- it's right in front of her office

④ In favor: The spotted owl is a majestic & endangered species. Are you in favor of helping to save this animal by implementing legislation protecting its habitat?

Against: The spotted owl is loud, takes up our trees + forests, eats other small animals, and does not help our environment. Are you against or in favor of legislation protecting it?

⑤ - when the effect is strong + consistent
- when the effect is logical
- when the cause precedes the effect in time
- when the experiment is done well, and n is large

UNIT #1-4

① $\text{avg} = \$15 = \frac{10+15+15+25+X}{5}$

$\$15 = \frac{65+X}{5}$

$\$75 = 65+X$

$\$10 = X$

② - Right-skewed
- 1 outlier @ 100-110
- min = 0
  max = 110
- center ≈ 30-40
- 5 # summary is best (not $\bar{x}$ and s) because it is skewed

③ Am. Lg. = sym.
(35, 77)
center @ 57

Nat'l League = left skew
(29, 67)
center @ 48

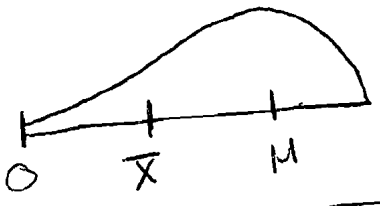
* overall Nat'l League seemed to be lower in # of HRs hit.

④ AL = $\bar{x} = 56.93$
$s = 12.694$

⑤ NL = min = 29
$Q_1 = 46$
Med = 50.5
$Q_3 = 55$
Max = 67
$IQR = Q_3 - Q_1 = 9$
range: (29, 67)

---

⑥



- left skewed
- $\bar{x}$ is pulled by skewness (outliers)

---

⑦ * all #'s are increased by 3

before: $\bar{x} = 49.75$
M = 48
$s = 14.75$

after: $\bar{x} = 52.75$
M = 51
$s = 14.75$

- $\bar{x}$ and M are increased by 3
- s doesn't change

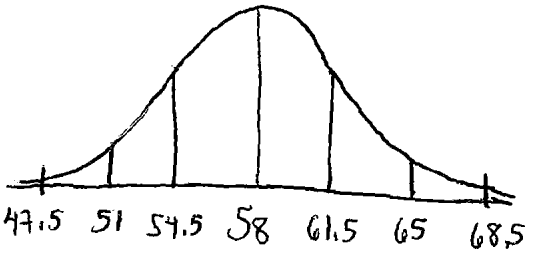
⑧ - $\bar{x}$ will increase (because now there is an outlier on the high end)
- s will change
- Med will not change

⑨ - right skew (longer on rt. side of plot)
- center @ 14
- spread: (2, 35)

⑩ min = 2
Q_1 = 6
Med = 14
Q_3 = 23
Max = 35

UNIT #5

① $\bar{x} = 58$
$s = 3.5$



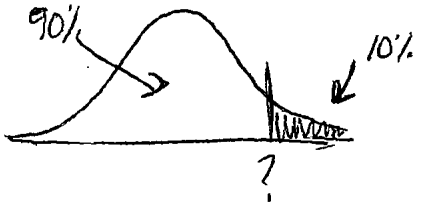
② $P(X > 55) =$ normalcdf(55, E99, 58, 3.5) = 80.43%

③ 7 mph over 55 = 62 mph

$P(X > 62) =$ normalcdf(62, E99, 58, 3.5) = 12.65%

④ $P(50 < X < 60) =$ normalcdf(50, 60, 58, 3.5) = 70.5%

⑤



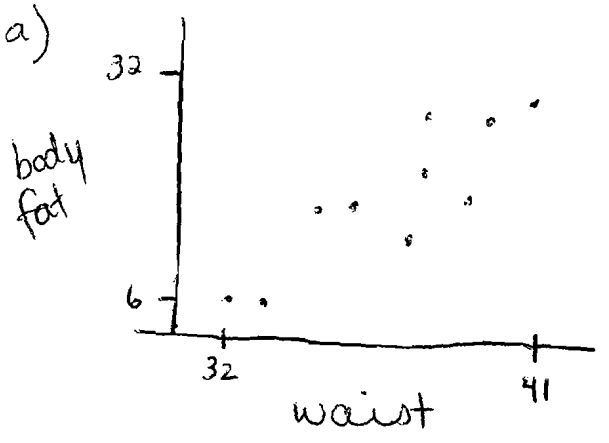
$P(X > ?) = 10\%$ $? =$ invnorm(0.90, 58, 3.5)

? = 62.49 mph

UNIT 6

① a) -0.71 b) 0.62 c) 0.03 d) 0.82

② a)



b) - positive
- linear
- moderate

c) $y = 2.79x + -82.51$

d) $y = 2.79(36) + -82.51$

$y = 17.93\%$

e) no - we can't determine cause + effect from one sample

③ $r = 1 \Rightarrow$ points are a perfect straight line, + slope

$r = -1 \Rightarrow$ " " " " " ", - slope

$r = 0 \Rightarrow$ there is no linear relationship with the points (could be curved)

UNIT #7

①

X	brown	red	yellow	blue	orange	green
P(X)	0.1	0.1	0.2	0.2	0.2	0.2

total prob = 1 = 100%

② a) $P(G) = 0.20 = 20\%$

b) $P(R \text{ or } Bl \text{ or } Y) = 0.1 + 0.2 + 0.2 =$ 50%

c) $P(O^c) = 1 - P(O) = 1 - 0.2 =$ 80%

③ a) $P(Bl) = 0.2$ $(0.2)(0.2)(0.2)(0.2) =$ 0.16%

b) $P(G) = 0.2$ $P(G^c) = 0.8$ $(0.8)(0.8)(0.8)(0.8) =$ 40.96%

c) P(one red) = R = red, N = not red

RNNN = 0.0729
NRNN "
NNRN "
NNNR "

0.2916

P(2 red) = RRNN = 0.0081
RNRR "
RNNR "
NRNR "
NNRR "

0.0405

P(3 red) = RRRN = 0.0004
RRNR "
RNRR "
NRRR "

0.0036

P(4 red) = RRRR = 0.0001

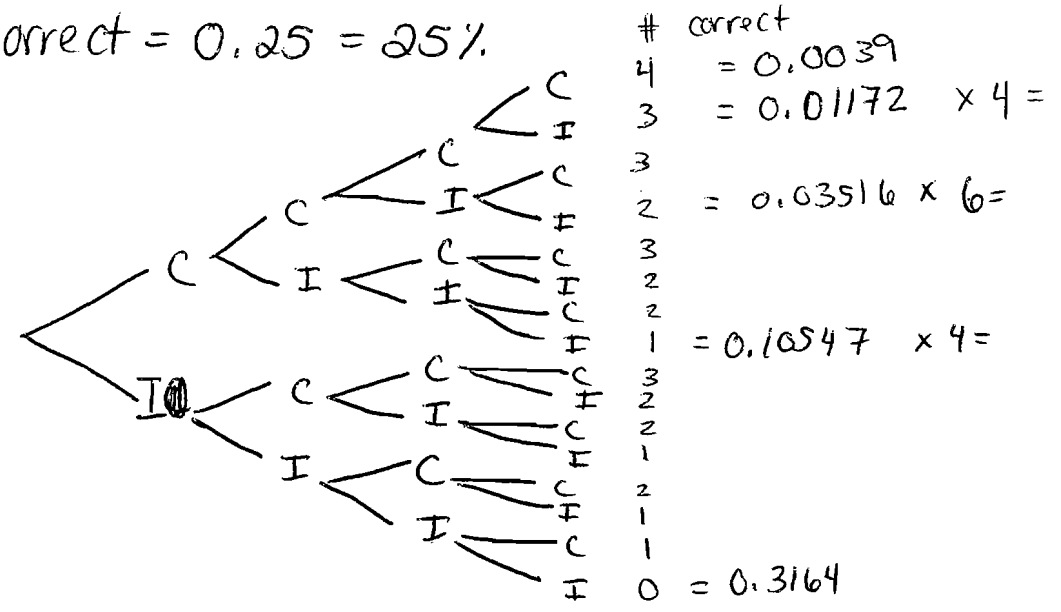
$0.2916 + 0.0405 + 0.0036 + 0.0001 = 0.3358 =$ 33.58%

d) N = not brown, B = brown

NNNB = 0.0729 = 7.29%

④ - Completely untrue. The chance of picking a red candy does not change just because you have or haven't picked one in a while.
- the picks are independent.

⑤ Correct = 0.25 = 25%



# correct
4 = 0.0039
3 = 0.01172 × 4 =
3
2 = 0.03516 × 6 =
3
2
2
1 = 0.10547 × 4 =
3
2
2
1
2
1
1
0 = 0.3164

# correct	0	1	2	3	4
P(C)	0.3164	0.421875	0.2109375	0.046875	0.0039

a) $P(X=4) = 0.0039$

b) $P(X=0) = 0.3164$

c) $P(X=1) = 0.421875$

d) $P(X \geq 1) = 0.6836$

⑥ $P(D) = 0.39$

$P(C) = 0.34$

$P(D \cup C) = 0.60$

a) $P(D \cap C) = ?$

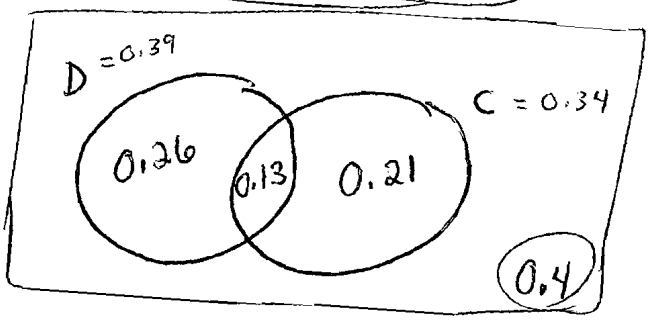
$P(D \cup C) = P(D) + P(C) - P(D \cap C)$

$0.60 = 0.39 + 0.34 - P(D \cap C)$

$0.60 = 0.73 - P(D \cap C)$

$P(D \cap C) = 0.13$

b)



$1 - P(D \cup C) = 0.40$

⑦ $P(F) = \frac{199}{331} = 60.12\%$

⑧ $P(\text{BY}) = \frac{191}{331} = 57.7\%$

⑨ $P(F \cap Y) = \frac{125}{331} = 37.76\%$

⑩ $P(F|Y) = \frac{125}{191} = 65.45\%$

⑪ $P(Y|F) = \frac{125}{199} = 62.81\%$

UNIT #8

① $P(X=4) = (0.35)(0.35)(0.35)(0.35) = 0.015$

$P(x \geq 4) = 0.48618$

$P(x \leq 4) = \cancel{0.51382}$ 0.75149

$P(x < 4) = 0.51382$

$P(x > 4) = 0.24851$

Use the following:

X	0	1	2	3	4	5	6	7	8	9	10
P(x)	0.01346	0.07849	0.17565	0.25223	0.23767	0.15357	0.06891	0.0212	0.00428	0.00051	0.000028

- Read across every 1 digit

② - First 3 digits w/o repeat are: 1, 7, 9
- Sample is: Brown, Ward, Taylor

③ a) not legit. adds up to 1.5

b) not legit. $P(X=5) = -0.2$ is not possible

c) not legit. $P(X=4) = 1.1$ is not possible

④ they become closer. Your experimental prob. becomes closer to your theoretical prob.

(5) 4 black, 12 white > 16 total 2 selections, no replacement

a) $P(Bl \cap Bl) = \frac{4}{16} \cdot \frac{3}{15} = 0.05 = 5\%$

b) $P(Bl \cap W) = \frac{4}{16} \cdot \frac{12}{15} = 0.20 = 20\%$

c) $P(Bl \cap W)$ or $P(W \cap Bl)$

$\left(\frac{4}{16}\right)\cdot\left(\frac{12}{15}\right) = 0.2$

or $\left(\frac{12}{16}\right)\left(\frac{4}{15}\right) = 0.2$

$\rightarrow 40\%$

d) $P(Bl \cap W) = \left(\frac{4}{16}\right)\cdot\left(\frac{12}{15}\right) = 0.2$

$P(Bl \cap Bl) = \left(\frac{4}{16}\right)\left(\frac{3}{15}\right) = 0.05$

$P(W \cap Bl) = \left(\frac{12}{16}\right)\left(\frac{4}{15}\right) = 0.2$

$\rightarrow 45\%$

(6) $E(X) = -\$1.55$

* multiply probability x value for each, then add up

UNIT 9

① $n = 1150$

$\hat{p} = 58\%$

a) $\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = (0.55147, 0.60853)$

(1prop z int)

b) We are 95% confident that the true % of residents that approve of the Governor's job performance is between 55.147% and 60.853%.

c) ?

d) It would become wider (0.54251, 0.61749)

e) It would become wider (0.54775, 0.61225)

② a) normal

b) $0.12 = p^*$

c) $\sqrt{\frac{p^*(1-p^*)}{n}} = 0.0174$

③ conditions

① SRS ✓

② $n \geq 30$ ✓

③ pop $\geq 10 \cdot n$ ✓

$H_0: p = 0.02$

$H_a: p > 0.02$

$\hat{p} = \frac{22}{628}$

$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = 2.691$

$P(z > 2.691) = 0.00357$

$\alpha = 0.05$

- We reject H_0 b/c p-value $< \alpha = 0.05$
- We have sufficient evidence that the true percent of drivers with expired inspection stickers is greater than 2%

UNIT #10

① $n = 50$
$\mu = 41.5$
$\bar{x} = 42.3$
$s = 4.3$
$\alpha = 0.05$

Conditions
① $n \geq 30$ ✓
② SRS ✓
③ $pqp \geq 10 \cdot n$ ✓

$H_0: \mu = 41.5$
$H_a: \mu > 41.5$

$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} = 1.3155$

$P(t > 1.3155) = 0.097z$

- We fail to reject H_0 b/c p-value $> \alpha = 0.05$.
- We have sufficient evidence that the true average amount of sugar in a 12 oz. soda is still 41.5g.

② $\bar{x} \pm t^* \cdot s/\sqrt{n} = (41.078, 43.522)$

We are 95% confident that the true avg. amount of sugar in a 12 oz. soda can is between 41.078 and 43.522 grams.

Unit #11

①

Grade	A	B	C	D	F
obs	89	121	78	25	12
exp	48.75	97.5	130	32.5	16.25

② conditions

① SRS ✓

② all expected counts ≥ 5 ✓

Ho: the observed sample distribution of grades in Bio fits the expected distribution.

Ha: the obs. distrib. of Bio grades doesn't fit the exp. distrib.

$$\chi^2 = \sum \frac{(obs - exp)^2}{exp} = 62.538 \qquad df = 4)$$

$$P(\chi^2 > 62.538) = 8.489 \times 10^{-13}$$

$\alpha = 0.05$

- We reject Ho b/c p-value $< \alpha = 0.05$
- We have sufficient evidence that the observed sample distribution of Bio grades doesn't fit the expected distribution.

③

	Y	N	
M	76.169	55.831	
F	114.83	84.169	

④ Conditions

① SRS ✓

② all expected counts ≥ 5 ✓

H_0: gender and eating breakfast are independent

H_a: gender and breakfast are dependent.

$$\chi^2 = \sum \frac{(obs - exp)^2}{exp} = 5.339 \qquad df = 1$$

$$P(\chi^2 > 5.339) = 0.0209$$

$\alpha = 0.05$ (assumed)

- We reject H_0 b/c p-value $<$ $\alpha = 0.05$
- we have sufficient evidence that gender and eating breakfast are dependent (there is an association).

⑤ $P(M) = \frac{132}{331} = 39.88\%$

⑥ $P(Y) = \frac{191}{331} = 57.7\%$

⑦ $P(F \cup N) = \frac{125+74+66}{331} = 80.06\%$

⑧ $P(M \cap N) = \frac{66}{331} = 19.94\%$

⑨ $P(M \mid N) = \frac{66}{140} = 47.14\%$

⑩ $P(Y \mid F) = \frac{125}{199} = 62.81\%$